

LEGISLATIVE ASSEMBLY FOR THE AUSTRALIAN CAPITAL TERRITORY

***THE PROVISION OF
QUALITY OUTDOOR LIGHTING
IN THE A.C.T.***

**REPORT NO.38
OF THE
STANDING COMMITTEE ON PLANNING AND ENVIRONMENT**

NOVEMBER 1997

STANDING COMMITTEE ON PLANNING AND ENVIRONMENT

Resolution of appointment of the Standing Committee on Planning and Environment:

[that] a Standing Committee on Planning and Environment [be established] to examine matters related to planning, land management, transport, commercial development, industrial and residential development, infrastructure and capital works, science and technology, the environment, conservation, heritage, energy and resources...

[And that the committee] inquire into and report on matters referred to [it] by the Assembly or matters that are considered by the committee to be of concern to the community.

[Further, that] if the Assembly is not sitting when the Standing Committee on Planning and Environment has completed consideration of a report on draft Plan variations referred pursuant to Section 25 of the *Land (Planning and Environment) Act 1991* or draft Plans of Management referred pursuant to Section 203 of the *Land (Planning and Environment) Act 1991*, the Committee may send its report to the Speaker or, in the absence of the Speaker, to the Deputy Speaker, who is authorised to give directions for its printing and circulation.

Minutes of Proceedings (Third Assembly) No.1 Thursday 9
March 1995, amended 22 June 1995

Committee Membership

Mr Michael Moore MLA (Chair)

Ms Roberta McRae, OAM MLA (Deputy Chair)

Ms Lucy Horodny MLA

Mrs Louise Littlewood MLA

Secretary: Mr Rod Power

The terms of reference for the inquiry were set out in the following resolution of the Assembly on 27 February 1997:

That:

(1) this Assembly calls on the Standing Committee on Planning and Environment to inquire into the provision of quality outdoor lighting in the A.C.T. and to make recommendations on the most appropriate strategies to be implemented as part of an overall plan to protect and enhance Canberra's night sky;

(2) in the course of the inquiry, the particular strategies the Committee should investigate will include:

(a) minimising light pollution having regard for outcomes for safety, security and tourism;

(b) requiring the Department of Urban Services to develop performance indicators for all of the street, path and outdoor space lighting under its control to ensure that spill light, sky glow and other wastage is minimised;

(c) tougher legislation to govern private outdoor lighting; and

(d) the basis of a cooperative Federal/A.C.T. agreement on outdoor lighting for the A.C.T.

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ADDITIONAL COMMENTS BY MRS LITTLEWOOD MLA

EXECUTIVE SUMMARY AND LIST OF RECOMMENDATIONS

This report by the Standing Committee on Planning and Environment follows a six-month examination of issues surrounding the provision of quality outdoor lighting in the A.C.T.

Many submitters assisted the committee, which benefited greatly from the written and oral material provided by the A.C.T. Government, the National Capital Authority, the Mount Stromlo and Siding Springs Observatory, a number of lighting associations and companies, and various individuals.

In the course of its inquiry the committee came to a view about what ‘quality outdoor lighting’ means. The committee considers that it is cost-effective and energy-saving lighting designed for a specific task and which facilitates public safety, security and recreation while preserving dark skies to the maximum extent possible.

The committee has concluded that not all aspects of Canberra’s outdoor lighting meet this definition.

In order to ensure quality lighting for present and future generations, the committee considers that specific steps should be taken. In terms of action that can be taken *in the short-term*, the committee has recommended that:

1. the Government hasten the current program to replace mercury vapour lighting in Weston Creek by, preferably, low-pressure sodium lighting.
2. the Government take appropriate steps to protect the quality of the outdoor lighting environment in the vicinity of Canberra Planetarium at Dickson. This may involve the installation of full cutoff lights along part of Antill Street, Dickson, and on the nearby sportsground.
3. the A.C.T. Government improve the coordination of matters affecting the standard of outdoor lighting (both public and private) by identifying one government agency as having overall responsibility for setting lighting standards and monitoring the implementation of those standards.
4. the Government facilitate active participation by its agencies in the development and testing of Australian Standards for lighting. Further, that - where appropriate - one or more Government agencies join, as institutional members, the International Dark Sky Association.
5. the Government ensure that high quality, down-only lighting is installed at all new sportsgrounds and at those existing sportsgrounds that are being refurbished. This includes the grounds at Bruce Stadium, Phillip and Manuka.

In terms of action that should be taken *in the longer term*, the committee recommends that:

6. the Government institute a cost-benefit analysis to determine the payback time of directionally efficient street lighting. The analysis should be reported to the Legislative Assembly.
7. the Government establish a body (comprising representatives of business, the tourist industry, police, government agencies and especially lighting professionals and retailers) to develop a strategy to promote the use of full cutoff lanterns in streetlights, carparks, car saleyards and other locations.
8. the Government commission a cost-benefit analysis of the introduction of low-pressure sodium luminaires of the full cutoff type in all street applications, and call for expressions of interest in mass producing an add-on shield for existing luminaires. The result of the cost-benefit analysis should be reported to the Assembly.
9. the Government facilitate the development of an education strategy to inform the people of the A.C.T. about the way that quality outdoor lighting can be provided. Representatives of business, the tourism industry, police, resident groups, astronomical groups, lighting professionals and retailers, the National Capital Authority, and other interested persons and organisations should be involved in developing the strategy. Demonstration projects and sponsorships should be encouraged by the education strategy.
10. the Government establish an advisory body to prepare an outdoor lighting code for the A.C.T. and to recommend how best to ensure compliance with the code. The advisory body should include, at the least, representatives of business, the tourism industry, National Capital Authority, police, resident groups, astronomical groups, lighting professionals and retailers. The lighting codes for Tucson and Arizona (in the US) and the codes submitted to this inquiry by the Astronomical Society of Victoria and the Outdoor Lighting Reform Action Group are useful starting-off points.

The committee considers that community consultation might be facilitated by involving an Assembly committee in this process and hence, the committee suggests that its successor committee in the Fourth Assembly (to be elected in February 1998) might take up this challenge.

In terms of matters *that involve liaison with the Commonwealth Government*, the committee recommends that:

- 11.the A.C.T. Government work with the National Capital Authority to minimise excessive lighting of ceremonial or national features of Canberra, including the outdoor lighting of Parliament House, Old Parliament House and Telstra Tower.
- 12.the A.C.T. Government bring all possible pressure on the Commonwealth Government to fund those elements of Canberra (including lighting) that relate to the city's national role.
- 13.the A.C.T. Government and the National Capital Authority investigate the development of a lighting master plan for Canberra, to be integrated into the marketing of Canberra as a tourist destination.

1. BACKGROUND

1.1. The Standing Committee on Planning and Environment is pleased to present its report into the provision of quality outdoor lighting in the A.C.T. The report contains eight chapters. This first chapter provides brief information on the establishment of the inquiry and the way it was conducted. Chapters 2-7 summarise the evidence presented to the committee (both written and oral). The final chapter sets out the committee's conclusions and contains some recommendations.

Establishment of the inquiry

1.2. The inquiry was established by resolution of the Legislative Assembly on 27 February 1997. In moving the motion to establish the inquiry, Ms Tucker MLA (A.C.T. Greens) stated:

- 'poor outdoor lighting not only pollutes visually but also unnecessarily increases greenhouse gas emissions and energy cost to the community';¹
- it is likely that '15 percent of light from public outdoor lighting goes directly into the sky without hitting a surface, and another 15 percent is reflected into the sky after hitting a surface, either usefully or uselessly'. This probably costs Canberra about \$448,000 pa;²
- 'Canberra's night sky is... an increasingly valuable economic asset', reflecting the fact that Mount Stromlo Observatory is located very close to the city and attracts many tourists;³
- Tuscon in Arizona 'has grown in population... [while it] has cut outdoor lighting costs and [still] maintained its working observatory';⁴
- the National Capital Authority [NCA] 'has no light pollution guidelines';⁵
- lighting standards for private lighting (such as car yards and sporting facilities) 'are not being effectively enforced in Canberra';⁶ and
- at present, 'no-one is taking responsibility. ACTEW says, "We are just selling the electricity", and Urban Services says, "We just build the lights", so there is no-one basically looking at the overall design of it'.⁷

1.3. Responding to Ms Tucker, the Attorney-General and Minister for the Environment, Land and Planning (Mr Humphries MLA) asked the committee⁸:

¹ *Debates of the Legislative Assembly for the A.C.T.* p518

² *ibid*

³ p518 and p520

⁴ *ibid* p521

⁵ *ibid* p519

⁶ *ibid*

⁷ *ibid* p521

⁸ *ibid*

not [to] get carried away with the concept of different technologies being applied to reduce the glare in the night sky of Canberra without considering the quite massive cost which conceivably could be entailed in effectively preventing that kind of light pollution from occurring.

1.4. As an example, he instanced the case of Mount Stromlo Observatory and queried whether the cost of insulating the Observatory from the lights of an expanding Canberra will be worth it. Perhaps, he wondered, it will become cheaper 'to move Mount Stromlo to somewhere further away from the urban landscape' - rather than place expensive constraints upon urban development around it.

Conduct of the inquiry

1.5. The committee conducted four public hearings to take oral evidence. The hearing dates, together with attendees, are listed in Table 1.

1.6. As well as holding the public hearings, the committee - accompanied by Ms Tucker MLA - conducted a night-time tour of Canberra on 24 June 1997. Also in attendance were representatives of the National Capital Authority, the Australian Federal Police, Mount Stromlo Observatory, the Outdoor Lighting Reform Action Group, Canberra Astronomical Society, Institute of Planners, Institute of Architects, Institution of Engineers, Canberra Planetarium and Observatory, and the Department of Urban Services (City Services; and Planning & Land Management).

1.7. The committee found the tour particularly helpful in understanding the impact of different types of lighting. Members of the committee extend their appreciation to those who organised, and attended, the tour.

Members of the Standing Committee on Planning and Environment, together with community and Government representatives, at Mount Stromlo Exploratory on the night of 24 June 1997

1.8. In the course of the inquiry, the committee received 21 submissions which are summarised in Table 2. The submissions are numbered in order of receipt, the final submission being that from the A.C.T. Government (received on 3 July 1997).

1.9. To the committee's surprise, two submissions came from overseas: one from the British Astronomical Association and one from the University of Virginia in the US (Dr Ianna). Members are aware that committees of the Commonwealth Parliament have received submissions, on occasions, from overseas; but this is the first time that the Standing Committee on Planning and Environment has received formal written material from other countries. It is likely that future inquiries also will see material sent to Assembly committees from overseas, as more and more people become used to the Internet. In Table 2, the committee has listed the Internet address of some submitters.

1.10. Continuing its usual practice, the committee has summarised the evidence given by submitters in succeeding chapters of the report: evidence from the A.C.T. Government (Chapter 2); from the National Capital Authority (Chapter 3); from Mount Stromlo Observatory (Chapter 4); from associations (Chapter 5); from companies (Chapter 6); and from individuals (Chapter 7). Where more than one submission is summarised in the same chapter, the submissions are arranged in alphabetical order.

TABLE 1 - LIST OF PUBLIC HEARINGS AND WITNESSES

20 June 1997:

Dr Bessell (Associate Director, Facilities, Mount Stromlo and Siding Springs Observatories)

Mr Lockwood (Convenor) and Mr van Behrens [Outdoor Lighting Reform Action Group of the South East and A.C.T.]

Mr Williamson and Ms Williams (Canberra Planetarium and Observatory)

27 June 1997:

Mr Johnston (Canberra Astronomical Society Inc.)

Dr Ianna (Associate Director, Leander J.McCormick Observatory of the University of Virginia; and Observatory Visitor at Mount Stromlo)

4 July 1996:

Mr Lynga

Mr Wilson (Principal, Lighting Analysis and Design)

Mr Simpson [Manager, Phillips Lighting; and President of the A.C.T. Chapter of the Illuminated Engineering Society of Australia and New Zealand (NSW) Inc.]

Mr Miller (Lighting and Allied products Pty.Ltd)

25 July 1997:

Mr Palmer (Manager, Infrastructure Management: Roads, Department of Urban Services) and Mr Jain (ACTEW).

1.11. The summary of evidence is used by members of the committee to come to terms with the principal points raised in the course of the inquiry. The committee does not claim that the summaries are exhaustive. Copies of submissions, along with the transcript of what was said at the public hearings, are available from the Committee Office of the Legislative Assembly.

TABLE 2 - LIST OF SUBMISSIONS

1. Mr Pozza
2. Mr Tabur
3. British Astronomical Association – Campaign for Dark Skies
[Internet: <http://www.u-net.com/ph/cfds/>]
4. Lighting Analysis & Design (Independent Lighting Consultants) [Mr R.R.Wilson]
[Internet: <http://light-link.com/lad>]
5. Mr W Wilson
6. Illuminating Engineering Society of Australia & New Zealand (NSW) Inc
7. Canberra Astronomical Society, Inc
8. Mr von Behrens
9. Mr Gösta Lyngå
10. Mount Stromlo and Siding Spring Observatories
11. Astronomical Society of Victoria Inc
[email: gdudley@swin.edu.au]
12. Outdoor Lighting Reform Action Group of the South East and A.C.T.
[email<klockwoo@agso.gov.au>]
13. Association Against Obtrusive Lighting (Victorian Branch)
14. Mr Morland
15. Mr Nelmes
16. Dr Ianna (Associate Director of the Leander J McCormick Observatory of the University of Virginia; and Observatory Visitor at Mount Stromlo)
[<pai@faraday.clas.virginia.edu>]
17. Lighting & Allied Products Pty Ltd
18. Dr Purcell
19. National Neon Signs
20. National Capital Authority
21. A.C.T. Government
[<http://www.act.gov.au>]

2. A.C.T. GOVERNMENT: EVIDENCE

2.1. The main points made by the Government relate to the following:

- Government priorities are safety, security, cost and night sky quality;
- a number of bodies are responsible for outdoor lighting;
- outdoor lighting assets;
- Government policy is to use high pressure sodium lights on main roads and mercury lights on other roads;
- semi-cutoff lights are used for cost reasons;
- sodium lights are used around Mount Stromlo Observatory; and
- the Government prefers to utilise Australian Standards rather than prescriptive controls and legislation.

Government priorities are safety, security, cost and night sky quality

2.2. The A.C.T. Government defined ‘quality lighting’ as ‘lighting that serves the purposes for which it was intended and which avoids waste’.⁹ In the Government’s view, the ‘lighting issues [that are] vitally important to Canberra’ include ‘the need to preserve and enhance existing levels of safety and security’ - as well as ‘night sky quality’.¹⁰ In relation to community security, the Government’s objectives are ‘public safety, primarily; minimisation of wasted light, especially upward spill of lighting, to preserve the night sky; and whole-of-life costs’.¹¹

A number of bodies are responsible for outdoor lighting

2.3. The Government stated that ‘responsibility for outdoor lighting in the A.C.T. is divided between a number of Government agencies’ including:

- the National Capital Authority;
- the Department of Urban Services (City Services Group), which ‘is responsible for lighting public roads, car parks, shopping centres and walkways’;
- the Department of Urban Services (Planning and Land Management Group), which ‘has an overall responsibility in relation to standards and application of outdoor lighting [and] where required under planning legislation, it administers lighting on private leases’;

⁹ Submission dated 2/7/97 p3

¹⁰ *ibid* p1

¹¹ *ibid* p5

- the Bureau of Sport, Recreation and Racing (in the Department of Business, the Arts, Sport and Tourism) 'is responsible for lighting of government sporting venues'; and
- ACTEW Corporation, which design and constructs 'most public lighting... on behalf of the A.C.T. Government'.¹²

2.4. Government officials told the committee that:

the regulatory regime at the moment is notionally through the planning process; but it is not an extensive control regime... Cases are looked at on a one-off basis. So, if somebody has a tennis court in their backyard with lighting on it and it is interfering with the next-door neighbour, then those cases are dealt with by the leasing people on a case-by-case basis. There is no current control on lighting beyond that into the public realm.¹³

Outdoor lighting assets

2.5. The Government submitted that 'approximately \$1.6m of new lighting assets are created annually'. Further, it stated that there are 'some 62,000 lights in Canberra', of which 'approximately 2,860 [are] cutoff lights'. The latter 'do not direct light above the horizontal plane'.¹⁴

2.6. More detailed information on the A.C.T.'s streetlights was provided to the Assembly on 27 February 1997 by the Minister for Urban Services, who stated that:

Currently, there are 58,649 streetlights under the DUS ownership connected to the A.C.T. streetlight system.

Total annual energy consumption for 58,649 lights is 35,649,017.95 Kilowatt hours.

The annual cost of electricity for 58,649 lights is \$3,158,503.

The spacing between streetlight columns depends on the road category, lamp type and luminaire and column type. Once these elements are selected, computerised design packages are used to determine column spacing. All new installations are designed to meet Australian Standard AS 1158.1 1986.

The typical cost of replacing a lamp on main roads and suburban streets varies between \$40.06 to \$114.32 and \$30.63 to \$111.50 dependent on lamp type. The cost of bulk bulb change is relatively less.

Main roads are being patrolled once every two weeks and other roads and areas once every three weeks. City Walk is inspected each week.

The average response time for repair is between two and four working days. Maximum response time is five working days.

¹² *ibid* p3

¹³ *Transcript* 25/7/97 p58 (Mr Palmer)

¹⁴ *Submission* p3

All lighting connected to the streetlighting system operates between dusk and dawn with turn on and turn off times being controlled by photo-electric cells positioned at various locations.

Government policy is to use high pressure sodium lights on main roads and mercury lights on other roads

2.7. The Government's policy with respect to street lighting is described as follows:

The Government's current street lighting program makes a clear distinction between lighting for major traffic routes and lighting for residential streets.

The program for improving traffic route lighting... is to:

- convert 400 watt mercury vapour lamps to 250 watt *high* pressure sodium lamps, at a cost of \$1.2m on the basis of the superior efficiency of high pressure sodium lamps and eventual energy savings of approximately \$250,000 pa with a cost recovery period of only four years; and
- complete the lighting of urban arterial roads that are only partially lit.

This will reduce the number of mercury vapour lights by 5,400.

For residential streets, however, the strategy envisages a move to a general use of mercury vapour lighting for the following reasons:

- this is common industry practice. Only the A.C.T. and New Zealand use *low* pressure sodium lighting in new installations;
- mercury vapour lamps are manufactured in Australia while *low* pressure sodium lamps are only available from overseas sources. Failure rates have increased in recent times and this is attributable to manufacturing quality;
- mercury vapour lamps have a longer life, seven years, compared to three years for low pressure sodium; and
- mercury vapour lamps have lower purchase and operating costs: up to 19 percent less.

The proposed program is also justified on grounds other than economic:

- mercury lamps produce a white light showing objects with superior clarity and closer to their natural colour;
- there is a clear community preference for mercury vapour lighting...

The cost of this program is approximately \$1.1m, for implementation over a number of years subject to available funding.

The outcome of this policy direction would be to increase the number of mercury vapour lights by approximately 11 percent.¹⁵

2.8. Government officials later corrected the statement about where mercury lamps are manufactured, advising the committee that ‘most of the [mercury] lamps used for streetlighting applications are imported’.¹⁶

2.9. Also, the officials stated that they were aware of the lower operating cost of sodium lamps over mercury lamps:

If we spend a bit more money now, in three or four years we will be getting our money back in the energy savings. So, we have been moving in that direction. We have done some work last year and we are doing some more in this current capital works program to change some of those fittings over...¹⁷

2.10. The Government opposes any measures to turn off street lighting after a certain hour, because it requires ‘extensive and very expensive modification’ to existing street lighting circuits (and in some cases would not be possible at all) and may reduce ‘public safety and security for motorists, cyclists and pedestrians’.¹⁸

Semi-cutoff lights are used for cost reasons

2.11. The Government acknowledged that cutoff lights ‘appear to offer many advantages’ but are not more widely used because of ‘the cost penalty’:

Semi-cutoff lights, because they spread light more widely, can be more widely spaced than cutoff lights. ACTEW’s advice is that on average only three semi-cutoff lights are required to substitute for four cutoff lights....

Because of this, it is not possible to simply substitute one kind of light fitting for the other. This could result in sections of unlit roadway between light columns which represent a serious traffic hazard. A conversion to cutoff lights would therefore involve substantial expenditure in placement of additional light standards.

The running costs for cutoff lights are 25 percent to 30 percent higher due to the extra number of lights required... [and] the extra poles create more of a hazard for motor vehicles to hit...

Savings of 25 percent to 30 percent may therefore be achieved in the cost of new street lighting installations and associated operating costs by using semi-cutoff lights.

To replace semi-cutoff lights on the road network with cutoff fittings would cost approximately \$12m...

¹⁵ *ibid* pp9-10 (emphasis in original)

¹⁶ Supplementary information provided by A.C.T. City Services (dated 29/9/97)

¹⁷ *Transcript* 25/7/97 p56 (Mr Palmer)

¹⁸ Submission p10

In predominantly pedestrian environments, the arguments against glare from semi-cutoff lights are less persuasive. A certain amount of glare may be perceived as additional light and may enhance a feeling of security...

[As] approximately eight percent of light is reflected back into the sky, cutoff lighting would increase this by 25 percent to 30 percent due to the extra number of light columns.¹⁹

2.12. Government officials reconsidered these comments after lodging the Government's submission and then advised the committee that the above reflected only 'an average' estimate; the actual situation was that:

Depending on what mix of various roads you [had], if you went completely to a cutoff [fixture] then [the cost increase] could be as much as 30 percent more... [depending on the] carriageway widths and mounting heights [of the lights]...

In essence, the more important the road... the wider [it is] and... the higher the lights are to achieve what is required...

There may well be some cases that have come out of this [re-evaluation] where we can use cutoff [lights] because it seems to be at no extra capital cost... [and if this is the case] then we certainly would want to go in that direction...²⁰

In converting from mercury vapour to high pressure sodium on main traffic routes, it may be possible in some cases to use existing pole locations and cutoff lighting.²¹

2.13. Further supplementary information from Government officials was to the effect that:

The Australian Standards specify a direct light emission above the horizontal of six percent. For main road lighting, direct light emission above the horizontal in Canberra is limited between 1.08 percent and 1.1 percent in almost all designs.

Advice from ACTEW is that in a typical cutoff light fitting, about 28.3 percent of the light is lost in the housing. In a typical semi-cutoff light, only 15.9 percent of light is wasted. A 250 watt high pressure sodium lamp, used in both fittings, emits 27,000 lumen. In semi-cutoff lights, 84 percent of the lumen are directed on the road compared to only 72 percent in a typical cutoff light.²²

Sodium lights are used around Mount Stromlo Observatory

2.14. The Government submitted that:

The Territory Plan provides that within five kilometres of Mount Stromlo, development or installations which may, through night time illumination or significant vibration, adversely affect the operation of the Mount Stromlo

¹⁹ *ibid* pp7-8

²⁰ *Transcript* 25/7/97 p54 (Mr Palmer)

²¹ Supplementary information provided by A.C.T. City Services (dated 29/9/97)

²² *ibid*

Observatory or the associated seismological vault at Mount Stromlo shall be referred to the Australian National University for examination and comment and reasonable steps shall be taken to mitigate adverse impacts.

Because the impact of mercury lighting increases exponentially as the distance between the light and the Observatory decreases, the Government has placed a moratorium on all new mercury vapour lighting installations within a five kilometre radius of Mount Stromlo.

The Government has also introduced a staged program for replacing existing mercury vapour lighting in Weston Creek with sodium. This will take a number of years depending on the Budget allocation, at a total cost of approximately \$0.8m.²³

The Government prefers to utilise Australian Standards rather than use prescriptive controls and legislation

2.15. The Government submitted that it prefers to rely on ‘existing and future Australian Standards’ rather than to develop performance indicators as suggested in the committee’s terms of reference. The Government stated:

All current lighting designs produced in the A.C.T. comply with the requirements of Australian Standard [on street lighting] (AS/NZS 1158.1, the Australian Public Lighting Code, or the new Standard AS/NZS 1158.1.1 - 1997) which has superseded part of AS 1158.1 - 1986.²⁴

[This Standard] does recognise glare as one of the parameters to be controlled. Glare is limited to a maximum of 20 percent.²⁵

Lighting for public sports grounds is also consistent with the relevant Australian Standards for training and/or competition use. An example is AS/NZS 2560 which governs the lighting of football grounds.²⁶

All installations in recent years [on sportsgrounds] require compliance with Standards in the contract specifications. This requirement will continue. It is estimated that there may be a very small number of older installations that still do not comply.²⁷

2.16. In relation to possible legislative changes, the Government stated a strong preference for ‘voluntary compliance... rather than... a punitive control and command approach’.²⁸ The Government would first want to be convinced there is ‘a problem that must be addressed immediately’ and, if there was, the Government would consider measures such as education programs and individual negotiation before agreeing to legislative measures.²⁹

²³ Submission pp8-9

²⁴ *ibid* p10

²⁵ Supplementary information provided by A.C.T. City Services (dated 29/9/97)

²⁶ Submission p11

²⁷ Supplementary information provided by A.C.T. City Services (dated 29/9/97)

²⁸ Submission p11

²⁹ *ibid* p12

2.17. The Government noted that the Environmental Protection Bill was before the Assembly and stated:

[The Bill] recognises that light when emitted may cause environmental harm, by including light in the definition of ‘pollutant’. However, the legislation does not specify the circumstances in which light pollution may cause environmental harm.

It is also conceivable that light may cause unreasonable interference with the enjoyment by the public or a person of a place or area. In such cases, there may be an offence of environmental nuisance. Whilst the legislation provides for offences relating to light pollution, there would need to be proof of environmental harm or nuisance before action would be taken.³⁰

³⁰ *ibid* p2

3. NATIONAL CAPITAL AUTHORITY: EVIDENCE

3.1. The National Capital Authority [NCA] made two key points:

- it has no specific outdoor lighting policy; but
- it uses nine principles in relation to outdoor lighting.

The NCA has no specific outdoor lighting policy

3.2. The NCA submitted that lighting ‘is not covered in a separate specific policy’ within the National Capital Plan but is mentioned in the Parliamentary Zone Development Plan which, however, is ten years old ‘and is being reviewed in order to consolidate the lighting principles outlined [below] and the various development and management requirements’.³¹

3.3. Further, the NCA advised that:

it has undertaken a detailed audit of the lighting in Anzac Parade, the Parliamentary Zone and Commonwealth Park. These audits revealed that lighting in these was inefficient and below the required standard. In the Parliamentary zone, the NCA has already embarked on lighting improvements in order to meet Occupational Health and Safety requirements.

Currently the NCA is preparing a detailed Strategic Lighting Implementation Plan in order to progressively improve lighting in the areas that it manages. [The Plan will be] based on the [following] principles...³²

The NCA uses nine principles to govern outdoor lighting

3.4. The NCA set out nine ‘principles [which] guide the implementation of lighting projects sponsored by the Authority’. These principles are:

The plan geometry of the National Capital and its special interrelationship with the landscape is to be readily distinguished at night...

Those buildings and urban elements which symbolise the role of the national Capital and its ceremonial qualities should be differentiated in the night landscape... [via] a hierarchy of building illumination and special effect lighting... [with] the highest level... [to be] Parliament House.

The ceremonial heart of the Capital is to be characterised by softer, white lighting...

Special, temporary lighting effects which are well considered and that celebrate the seasonal festivities and events in the Capital will be encouraged...

Lighting is to enhance both the night and day time environment of the National Area... Along Anzac Parade, Kings, Constitution and Commonwealth

³¹ Submission dated 30/6/97 p4

³² *ibid* p5

Avenues the streetlights should be of a consistent character and quality which signifies their symbolic value.

A safe night time environment for visitors to the National Area must be provided... [to ensure] a level of safety and security. This requires light installation and fittings to be designed to provide good illumination with minimal glare.

The environmental impact of artificial lighting is to be minimised. To minimise night sky pollution the NCA supports the principle of utilising full cutoff lamps, where prudent and practical. The efficiency of full cutoff lamps is continually improving and where lighting in new areas has been designed in conjunction with the placement of trees, the results are very successful. In established areas it is often not feasible to use full cutoff lighting... Similarly, there will always be some elements and features in the National Area that will require an upward throw of light to achieve the necessary illumination and lighting effect.

A lighting system which is simple, economical to maintain and utilises best practice in design and construction is to be established. The NCA is committed to reducing recurrent and life cycle maintenance costs. To this end, the NCA is, where practical, standardising luminaire types for each land use and where possible selecting energy efficient lamps. When light installations are due for complete replacement, the NCA is investigating alternatives, with the view to standardising light fittings and reducing energy consumption.

*The relevant Australian Standards for lighting are to be complied with...*³³

³³ ibid pp2-3 (emphasis in original)

4. MT STROMLO AND SIDING SPRINGS OBSERVATORIES: EVIDENCE

4.1. The Observatories made these points (*inter alia*):

- outdoor lighting is too bright;
- a lighting code is required;
- full cutoff, sodium lights should be used;
- there should be one agency in overall control of the Government's outdoor lighting policy;
- the Government should join the International Dark Sky Association; and
- Mount Stromlo benefits the Canberra economy.

Outdoor lighting is too bright

4.2. The Observatories are concerned about 'the poor standard of lighting on many car parks, car yards and sports grounds' - which show an 'extreme lack of sensitivity to the environment'. The Observatories submit that the Government relies too much on overhead street lights to aid night-time driving, rather than using other techniques such as 'greater use of reflectors on curbs, edges, and medians and subdued direct lighting of intersections and signs'. Also, the Observatories suggest 'a curfew on illuminated advertising signs, car yards, and public buildings except for security lights [as] few people are around to see such illuminations after midnight'.³⁴

A lighting code is required

4.3. The Observatories state that the best way to obtain quality outdoor lighting is to introduce 'a good Outside Lighting Ordinance so that lighting vendors, consultants, architects, developers and managers have a legal requirement to use good lighting and not the cheapest':

Good Lighting Ordinances are in place in many cities [in the USA and Europe]... after pressure from power utilities (to save electricity), from road users (to reduce glare), from those living near shopping centres and sports grounds (to prevent light trespass) and from amateur and professional astronomers and other concerned citizens keen to limit the sky glow that masks the beauty of the night sky.³⁵

4.4. The Observatories attached a copy of lighting ordinances used in Tuscon and Flagstaff (both in Arizona). These ordinances 'prohibit installation of offensive lighting fixtures, while leaving existing lighting fixtures in place during their operational lifetime'.³⁶ The Observatories state that Tuscon has more than doubled its

³⁴ Attachment to submission dated 6/5/97, being the Observatories' submission to the 'National Capital Beyond 2000 Study' (August 1996) p3

³⁵ Submission p1

³⁶ Attachment to submission p6 [emphasis in original]

size since 1966 but the skyglow in yellow light has stayed about constant and the skyglow in blue has actually decreased'.³⁷ The committee found the two lighting ordinances useful.

4.5. The Observatories stated that a lighting ordinance, or code:

should not interfere with [residential] housing, except around observatories; otherwise, you will get no support from the public. [And] in fact, most of the light [needing regulation] does come from streetlighting, shopping centre lighting and security lighting.³⁸

4.6. The Observatories consider that a lighting code should 'deal with the kind of streetlighting that is possible' and 'also deal with advertising lighting and say that you should not have advertising lighting on after certain hours'. Sportsground lighting should be subject to a similar curfew. The code should 'encourage people to use internally lit advertising signs [because] the contrast is lower... and they can be left on for much longer periods'. The code should also deal with car park lighting and, in relation to security lighting, should require it to be placed 'at a much lower level than the normal advertising lighting':

So, in caryards, they have bright lighting on when the public is around, but when the public is away you turn off the bright lighting and there is a faint lighting which is left on afterwards.³⁹

4.7. The Observatories added:

There is now... an advisory Standard on obtrusive lighting [in Australia], which took three or four years to be prepared... So, for the first time, there is now some official recognition that glare and obtrusive lighting are problems. That will help us, I think.⁴⁰

Full cutoff, sodium lights should be used

4.8. The Observatories expressed great concern about 'a very deleterious plan to install 50W mercury lamps throughout Canberra, except on main roads where partial cutoff high pressure sodium will become the norm':

Such mercury lamps are completely forbidden under all enacted outdoor lighting codes in Europe and the USA. Mercury lamps are very inefficient converters of energy into visual light, thus using up more fossil fuels and adding to global warming. They also produce much larger amounts of blue light, not useful for human sight but that scatters more from the aerosols in the atmosphere and produces greater impact on astronomy.

We believe it very important [that] full-cutoff lamps for high pressure sodium roadway lighting should be used, as it was in the A.C.T. until a change in

³⁷ *ibid* (Executive Summary)

³⁸ *Transcript* 20/6/97 p4 (Dr Bessell)

³⁹ *ibid* p5

⁴⁰ *ibid* p15

ACTEW policy a few years ago, and that low pressure sodium be used in areas of astronomical sensitivity such as areas around Mount Stromlo.⁴¹

4.9. The Observatories expanded on their concern about ‘the efficiency of lighting and the level of lighting in the Weston Creek area suburbs... [near] to Mount Stromlo’:

We were recently informed that... lack of funds had not only slowed the change from high pressure mercury lamps to high pressure sodium lamps but that the flat window full-cutoff fixtures that were starting to be introduced about five years ago in the high pressure sodium lamp housings were no longer being used. Instead, a curved windowed fixture with much worse light spill was now the standard.

We urge the Government to honour their agreement to phase out high pressure mercury lamps in the Weston Creek area as soon as possible, to reintroduce full-cutoff replacement lanterns and wherever possible to use low pressure sodium lamps. Such improvements are expected to reduce by up to 20 percent the brightness of the night sky over Mount Stromlo Observatory.⁴²

4.10. The Observatories submit that the Department of Urban Services and ACTEW are reluctant ‘to accept that full cutoff light fixtures can be retrofitted to existing mountings’ - despite the experience of Los Angeles and San Diego. The former ‘is completely replacing its mercury lighting with low-pressure sodium... [and state that] they have not had any complaints from the public at all...’⁴³ In retro-fitting about 31,000 lights in the 1980s to low pressure sodium, San Diego found that the ‘payoff period to convert to low pressure sodium’ was approximately three years, whereas it would be six years had high pressure sodium been used. The retro-fitting brought down the energy cost per street light and:

There has been essentially no adverse feedback from the public concerning the low pressure sodium lighting. The only apparent operational difficulty was using non-cutoff fixtures near traffic signals, where the yellow of the low pressure sodium could be confused with the yellow of the traffic signal. This was cured by using full-cutoff low pressure sodium fixtures at such locations.⁴⁴

4.11. The Observatories’ submission included a chart entitled ‘Life Cycle Cost Comparison’, which compared the operating cost and internal rate of return of 175W mercury vapour lamps with 70W high pressure sodium lamps (see Figure I). The chart shows that, although the replacement cost of the sodium lamp is higher than its mercury equivalent, the annual operating cost over ten years is less.

⁴¹ Submission pp1-2

⁴² Attachment to submission p2

⁴³ Submission

⁴⁴ ‘Summary of the City of San Diego Street Light Conversion Program’ (International Dark Sky Association), attachment to the Observatories’ submission

4.12. The Associate Director of the Observatories stated that it is possible ‘power for streetlighting is much more expensive in the US and in Europe [than in Australia] and therefore you can make a bigger case there, on the basis of saving funds, than you can in Australia’.⁴⁵

There should be one agency in overall control of the Government’s outdoor lighting policy

4.13. The Observatories express concern that ‘there seems to be no agency that has responsibility’ for ensuring an adequate standard of outdoor lighting.⁴⁶

The Government should join the International Dark Sky Association

4.14. The Observatories suggest that ACTEW, the Department of Urban Services and the National Capital Authority join the International Dark Sky Association.⁴⁷

Mount Stromlo benefits the Canberra economy

4.15. The Observatories stated that Mount Stromlo Observatory is estimated to have a working life beyond 25 years.⁴⁸ In stressing the contribution of the Observatory to the business, academic and tourist attraction of Canberra, the Observatories submitted:

Provided the sky at our Stromlo location becomes no brighter than it is in 1996, we can do world-beating science at Stromlo in 2010 and undercut our competitors by our low-cost on-site operation right next to our engineering workshops... [These workshops] can operate as an international contractor... [as well as] facilitate local companies’ entry into this market by providing the scientific input required at the interface between science and engineering. We identify Auspace P/L and Electro-Optics Systems as our primary local associates in this area. Mount Stromlo Observatory is very much part of the Canberra region’s high-tech future....

We shall also be able to conduct our student training mission without having to support our students at remote locations in order to learn observational astronomy. We shall also be able to show the public a working observatory rather than a museum... [and] we also expect to be operating a part-time public observatory from our site as the Stromlo Exploratory develops...

The Stromlo Exploratory will be a unique national tourist attraction communicating the excitement of astronomical discovery...⁴⁹

⁴⁵ *Transcript 20/6/97 p2 (Dr Bessell)*

⁴⁶ *Submission op cit*

⁴⁷ *Attachment to submission p3*

⁴⁸ *ibid p4*

⁴⁹ *ibid pp1-2*

5. ASSOCIATIONS: EVIDENCE

ASSOCIATION AGAINST OBTRUSIVE LIGHTING (VICTORIAN BRANCH)

A lighting code is required

5.1. The Association Against Obtrusive Lighting called for ‘a Code for night-time lighting’ incorporating:

- ‘a combination of lighting types’ in streets: ‘A standard street light should be installed on a corner or a cul de sac. It would be sensible then to install a low light at the fringe of the darkness of the high light source’, resulting in ‘a larger spacing between the high street lights’;
- measures to reduce ‘light trespass’ (‘when lights shine onto your property’);
- a requirement that ‘owners justify any ‘lighting which points above the horizontal’ (for example, billboards);
- measures to advise advertisers that ‘downlighting... [is nearly always] more cost effective’; and
- measures to ‘retrofit inefficient lanterns with more effective types... [resulting in] a saving to the environment and therefore a saving to the public purse’.⁵⁰

ASTRONOMICAL SOCIETY OF VICTORIA INC.

5.2. The Astronomical Society of Victoria Inc made the following points (*inter alia*):

- Mount Stromlo benefits the Canberra economy;
- four ways that light pollution harms the environment;
- a lighting code is required; and
- sodium lighting should be used.

Mount Stromlo benefits the Canberra economy

5.3. The Astronomical Society stated that ‘the A.C.T.... has literally millions of dollars tied up in astronomical equipment on Mount Stromlo and elsewhere’ and should not permit this facility to be threatened by poor lighting standards:

It is unusual to have a world famous astronomical installation and not protect its night-time environment by law. For example, the observatories on Kitt Peak, Arizona, Mt Wilson and Palomar Mountain all have legislation protecting them...

⁵⁰ Submission dated 2/5/97

There is an interim Australian Standard, AS 4282 INT which is specifically designed to protect astronomical observatories. However, at present, that Standard is not official and is not expected to be so until December 1997 at least. Unfortunately, it is not a compulsory Standard. However, local councils and other bodies should be encouraged to comply.

We know of one other council which has enacted a code (Cessnock NSW) which was developed primarily to protect Coolang Observatory.⁵¹

Four ways that light pollution harms the environment

5.4. The Astronomical Society attached a paper which claimed that:

Light pollution harms the environment in four ways: (i) Urban sky glow hinders professional and amateur astronomy and deprives the public of its view of the night sky; (ii) Coal, oil, and nuclear fuels are mined and consumed in large amounts merely to light the night sky; (iii) The monies spent on unproductive lighting of the night sky are not available for more worthwhile uses; (iv) The fossil fuels burned to produce harmful lighting also contribute to air and water pollution....

Light pollution is the one form of pollution whose solution can produce immediate economic, aesthetic, utilitarian, and environmental benefits...

Street lights, parking lot lights, and security lights ought to use low pressure sodium lamps [which] offer the best economy of any light source and [which are] by far the least harmful to astronomy.⁵²

A lighting code is required

5.5. The Astronomical Society of Victoria defined 'effective and efficient night lighting' as 'using the right amount of light for the task, producing adequate visibility at minimal cost'.⁵³ The Society appended a draft Outdoor Nightlighting Code which is 'based on the New Zealand Golden Bay County Code'. The committee found this Code useful.

Sodium lighting should be used

5.6. The Society also expanded on the nature of sodium lighting:

Low pressure sodium lighting is by far the most energy efficient of all present systems. The fixtures are larger than high pressure sodium but smaller than fluorescent, consequently the fixtures are somewhat more expensive than high pressure sodium....

Lighting designers frequently specify high pressure sodium over low pressure sodium lighting... because of a perceived reluctance of the public to accept the deep yellow colour of the low pressure sodium lamps. This is spurious. Where extensive low pressure sodium lighting has been installed for economic reasons

⁵¹ Submission dated 2/5/97 p2

⁵² 'Economics of Light Pollution' by Tim B.Hunter and David L.Crawford pp2-3 [International Dark-Sky Association, Arizona, USA]

⁵³ Attachment to the submission p5

and for protection of major astronomical observatories in San Jose (Lick Observatory), Long Beach (energy savings) and San Diego (Mount Palomar Observatory), all in California, Tucson (Kitt Peak National Observatory) in Arizona, and throughout Europe (energy savings), public acceptance has been high, particularly when they understand the expected cost savings.

Low pressure sodium lighting produces its entire output in a very narrow band of the visible light spectrum. This allows astronomers to filter out sky-glow caused by low pressure sodium lamps fairly easily and explains their enthusiasm for these light sources.⁵⁴

5.7. The Astronomical Society described the situation in the A.C.T. as follows:

A variety of fixtures and light sources are used. Mercury vapour arc is the most common. These fixtures may have been cheap originally but consume far more electricity than necessary and are costly today. Street lighting is generally poorly shielded, producing considerable glare and trespass. Private property lighting is frequently totally unshielded. Timers and motion or heat sensing controls are essentially unknown.⁵⁵

BRITISH ASTRONOMICAL SOCIETY

5.8. The British Astronomical Society submitted that many bodies in Britain are taking steps to improve the quality of outdoor lighting:

- the British lighting industry is producing many good luminaires nowadays restricting light to below the horizontal;
- the Highways Agency, which lights all main roads in the UK, ... now use[s] only downward-directed luminaires on the recommendation of the British Government's Department of Transport...;
- the three largest British supermarket chains, namely, Safeway, Tesco and J.Sainsbury... have confirmed in writing... that they now operate policies of restricting outdoor light to below the horizontal in their premises, and using minimum lighting when the sites are unoccupied;
- [the Crime Prevention Unit of the British Government's Home Office: Papers 28 and 29] found no appreciable link between high lighting levels and reduction in crime; [and]
- dozens of local councils (examples are South Somerset, Suffolk, Knowsley, Worcester, Dorset) have now incorporated clauses on the prevention of light pollution into their structure plans, which set their general policies for the foreseeable future.⁵⁶

CANBERRA ASTRONOMICAL SOCIETY INC

5.9. The Canberra Astronomical Society made the following points (*inter alia*):

⁵⁴ *ibid* p7

⁵⁵ *ibid* p8

⁵⁶ Submission received 16/4/97

- night sky-based activities assist the Canberra economy;
- there should be a rating system for domestic lighting; and
- there should be more controls on domestic, industrial and commercial lighting.

Night sky-based activities assist the Canberra economy

5.10. The Canberra Astronomical Society considers that Canberra' efforts to promote itself as an 'eco-tourist' destination are greatly aided by the presence of facilities such as those at Mount Stromlo (including the new Exploratory), Questacom, 'a planetarium at the Downer Observatory, the space tracking station at Tidbinbilla and the Canberra Astronomical Society hosting public viewing nights in Weston Park... The only other thing we need to guarantee is a dark sky'.⁵⁷

There should be a rating system for domestic lighting

5.11. The Society is disappointed about the absence of an advisory, or rating, system applying to domestic lighting, despite the fact that lighting gives off great amounts of heat ('96 percent of the energy used to power an incandescent bulb generates heat and only four percent of the energy used produces light') and the fact that 'coal burning electricity plants add huge amounts of carbon dioxide (a green house gas) to the atmosphere'.⁵⁸

5.12. Mr Johnston (for the Canberra Astronomical Society) stated:

Excessive lighting is not an accident. There is a lack of control and... a lack of understanding of necessary installations to achieve desirable lighting. There is even a bigger lack of desirable fixtures being sold... There is a need to have some direction within the industry that will result in increased awareness of lighting problems and solutions...⁵⁹

There should be more controls on domestic, industrial and commercial lighting

5.13. The Society considers that light pollution would be reduced if there were more controls on domestic, industrial and commercial lighting:

Domestic lighting:

1. Discourage the use of ball type light fittings in yard applications... [because they send] most light sideways and skyward and require high power bulbs...
2. Ban all unshielded exterior fittings as inclusions on new dwellings or as additions to established dwellings...
3. Apply the same process used in building and extension work, that is, plans for additional exterior lighting to be submitted for comment or approval by neighbours affected.

⁵⁷ Submission dated 26/4/97

⁵⁸ *ibid*

⁵⁹ *Transcript 27/6/97 p21*

Industrial and commercial lighting:

1. Ban the use of upward facing billboard lights. A limit to both wattage and number of lights used should be introduced.
2. Restrict security lighting to low pressure sodium fittings with full cutoff shields...
3. Ensure that all building facade lighting is down-facing or at least correctly focussed with no over spill.⁶⁰

5.14. Mr Johnston cited the new Winchester building in Belconnen as an example of fine outdoor lighting: 'It has the most superb parking lot... [with] full cutoff heads. You do not see anything above the light fixture... [and so] that parking area does not present a problem to anyone else'.⁶¹ Mr Johnston also suggested the use of solar powered light posts on cyclepaths.

CANBERRA PLANETARIUM AND OBSERVATORY

5.15. The Canberra Planetarium and Observatory stated that it was visited by about 15,000 people in 1996, that it is probably now 'Australia's premier public observatory' and has nine astronomers on staff. It expressed concern at the possibility of losing the present view of dark skies from its Dickson Observatory: 'I worry that in the years to come, as Canberra gets bigger, the lighting will get worse. I think something has to be done to control it... some type of ordinance to cut down the glare...' ⁶²

ILLUMINATING ENGINEERING SOCIETY OF AUSTRALIA AND NEW ZEALAND (NSW) INC

Australian Standards apply to sportsground lighting

5.16. The Illuminating Engineering Society of Australia and New Zealand (NSW) Inc. submitted that:

For sports lighting design there are Australian Standards recommendations which define the optimum performance parameters which include glare minimisation requirements. The recently released Australian Standard AS4282 - 'Control of the Obtrusive Effects of Outdoor Lighting' - also gives guidelines specifically on this topic. Major commercial outdoor lighting designs are usually carried out by engineering professionals taking the above requirements into consideration. Not all outdoor lighting projects, however, have the benefit of suitably qualified input, and consequently the resultant installations often lack [these] considerations.⁶³

⁶⁰ Submission

⁶¹ Transcript 27/6/97 p24

⁶² Transcript 20/6/97 p8 and p15 (Mr Williamson and Ms Williams)

⁶³ Submission dated 28/4/97

OUTDOOR LIGHTING REFORM ACTION GROUP OF THE SOUTH EAST AND A.C.T.

5.17. The Outdoor Lighting Reform Action Group of the South East and A.C.T made these points, among others:

- there should be financial studies, sponsorships, education strategies and legislation;
- there are guidelines but no lighting standards at present;
- sodium lights should be used;
- payment for electricity should be linked to the quality of lighting; and
- there should be a curfew on outdoor lighting of Parliament House.

There should be financial studies, sponsorships, education strategies and legislation

5.18. The Outdoor Lighting Reform Action Group called for the following action:

- *with respect to street lighting*, that ‘a cost-benefit analysis [be done] to determine the payback time of directionally efficient street lighting, in both new infrastructure and areas selected for retrofit’;
- further, that ‘a feasibility study [be undertaken] of community input into... [the] monitoring of failed light fixtures’ - by groups such as Neighbourhood Watch, ‘the amateur astronomical community and/or the conservation groups’; and
- a ‘demonstration project [be undertaken] of full cutoff lights along Antill Street, Dickson, in the vicinity of the Canberra Planetarium/Observatory;
- *with respect to ‘other public lighting’*, that the Government encourage its agencies ‘to seek out sponsorships for high quality energy and directionally efficient lighting of banners, heritage buildings, et cetera during celebratory occasions’;
- also, that the Government abandon ‘the use... on pedestrian ways, cycle ways and car parks... of omni-directional light types and ... examine the feasibility of solar powered types of appropriate intensity’; and
- that the Government develop, for schools, ‘an information kit on various cost saving strategies for outdoor lighting’ (now that schools are ‘responsible for their own lighting’);
- *with respect to commercial lighting*, that the Government provide ‘an advisory service to car yards, secure storage operators, et cetera on time-controlled and motion-detector controlled lighting’;
- that legislation be introduced ‘to require conformity to quality standards on light trespass, glare and sky pollution’; and

- that the Government introduce ‘tight controls over advertising as gained by illumination of construction cranes’;
- *with respect to other matters*, that the Government require ‘the down-light only option’ at Bruce Stadium (for example, by using the ‘Soft Lighting’ option);
- further, that the Government develop ‘an advisory service to sporting clubs on directional controls of sports lighting’;
- that legislation be introduced ‘to require conformity to quality standards’; and
- that the Government introduce, for residents, ‘an advisory service and legislative controls’.⁶⁴

5.19. The Action Group included its own ‘sample lighting code for the consideration of this committee’⁶⁵. Members found this sample code helpful. The Action Group also included a figure showing examples of ‘good’, ‘poor’ and ‘very poor’ lights, graded on the effectiveness of the light (Figure 2).

FIGURE 2 - EXAMPLES OF LIGHT TYPES

⁶⁴ Submission dated 2/5/97 pp1-2. The Outdoor Lighting Reform Action Group consists of the Conservation Council of the South-East and Canberra, the Canberra Astronomical Society and the Canberra Planetarium (incorporating the Canberra Observatory).

⁶⁵ *ibid* Appendix 2

5.20. The Action Group stated that Cessnock and Coonabarabran in NSW are places ‘where local government lighting controls are in effect’; that Tuscon in Arizona has had ‘25 years of lighting ordinance and community campaigning’; that ‘the border area between France and Belgium [shows] the effects of two radically different lighting practices [that] are detectable by satellite from 800 km attitude’; that some counties in Florida have implemented “dark schools” policies which ‘have resulted in decreased property crime rates and higher arrest rates’; and that some railway stations in Sydney utilise ‘lighting systems... donated by the commercial sector to demonstrate their wares’.⁶⁶

5.21. The Action Group offered to facilitate ‘a seminar and a follow-up working group to assist the legislative drafting process’ (if the Standing Committee on Planning and Environment thought this would be useful).⁶⁷

There are guidelines but no lighting standards at present

5.22. The Action Group attached to its submission a letter from the (then) A.C.T. Planning Authority (dated 1996) which stated:

In regard to standards for the emission of light from external sources, there are no standards in the A.C.T., but there are some guidelines which are used for major lighting projects such as for sports ovals.⁶⁸

5.23. In relation to approvals for sporting and commercial outdoor lighting systems, the Action Group claimed that, at present, ‘approvals... can be granted in such a way as to result in departures from Australian Standards. These [lighting] systems are difficult to amend because of ambiguous division of responsibility between Urban Services and Environment and Planning’.⁶⁹

Sodium lights should be used

5.24. The Action Group provided information on the ‘lumens of light units gained from a Watt of power for various types of fixtures’. This information is reproduced in Table 3.⁷⁰

5.25. The Action Group stated: ‘When the lifetimes and equipment costs are considered, sodium lamps are easily the most economic’. The Group estimated that ‘about 15 percent of all night-time citylight is... emitted above the horizontal plane of the light fixtures’, resulting in a dollar wastage of about \$448,000 pa.⁷¹ The Action Group calls for ‘a cost-benefit analysis... of the introduction of low-pressure sodium luminaires of the full cutoff type in all street applications... [and adds that] expressions of interest in mass producing an add-on shield for existing luminaires should be issued in the short term’.⁷²

⁶⁶ Submission

⁶⁷ *ibid*

⁶⁸ *ibid* Appendix 3

⁶⁹ Appendix 2 p3

⁷⁰ *ibid* p8

⁷¹ *ibid*

⁷² *ibid* p13

TABLE 3 - LUMENS OF LIGHT FOR VARIOUS FIXTURES

Lamp type	Lumens per Watt	Common in A.C.T. streets	Sportsfields and caryards
Incandescent	15-20	No	No
Fluorescent	40-60	Older inner suburbs	No
Mercury vapour	40-50	Yes, various	No
Metal halide	65-90	No	Yes
Low pressure sodium	90-160	Yes [on] Category B[roads]	No
High pressure sodium	60-110	Yes [on] Category A [roads]	Yes

Payment for electricity should be linked to the quality of lighting

5.26. In relation to the cost of electricity, the Action Group stated:

In the A.C.T, electrical power is converted to light in a set of luminaires of highly variable efficiency. In new minor roads a developer installs lights and passes on the cost to ACTEW Corp. After evaluation against the minimum standard, ACTEW takes over operation and maintenance of this component of the system. ACTEW buys electricity, and uses it to power a street-lighting service for which we can find (except for conforming to the five kilometre zone around Mount Stromlo under the National Capital Plan) no performance indicators suited to the special character of Canberra. This is done on behalf of the Department of Urban Services Roads and Traffic which reimburses the electricity charges without scrutiny of service levels against quality criteria...

We propose that payment for lighting be linked to quality of system performance.⁷³

There should be a curfew on outdoor lighting of Parliament House

5.27. The Reform Action Group stated that ‘the [Bogong] moth is an important part of the diet of the endangered pygmy possum’ and it is unacceptable that excessive lighting leads to ‘mass kills of... nocturnal migratory species’.⁷⁴ The Action Group attached an article that claimed ‘a CSIRO entomologist’ suggested, unsuccessfully, that ‘the bright lights [on the flagpole at Parliament House]... [be] turned off at, say 3.00am’ - which would lead ‘the moth swarm on the outside of [Parliament House to] resume its journey, instead of being instinctively driven by the arrival of dawn to hide in any nook or cranny’ of the building.⁷⁵

⁷³ ibid p7

⁷⁴ ibid p4

⁷⁵ ibid p18

5.28. The Reform Action Group stated that the National Capital Authority has directed that the proposed lights on Telstra Tower ‘will have to be off for the migration period’ of the Bogong Moth.⁷⁶

⁷⁶ *Transcript 20/6/97 p11 (Mr Lockwood)*

6. COMPANIES: EVIDENCE

LIGHTING AND ALLIED PRODUCTS PTY LTD

Cutoff lights should be used

6.1. Lighting and Allied Products Pty Ltd (Mr Bianco, Marketing Manager) submitted that 'a well designed installation using high performance reflector system cut-off luminaires is the best approach to achieving a quality environment-vis-a-vis lighting':

The importance of the use of Reflector System Cut-off Luminaires to achieve a quality outdoor lighting installations has been documented in Australian Standard AS 4282 (INT)-1995 whereby, Level 1 lighting control is best achieved by the use of a Category C Luminaries, ie Cut-off.⁷⁷

6.2. Mr Bianco submitted that examples of this kind of light fixture are found at Woden Valley Hospital, the new Foreign Affairs & Trade Building in Barton and the new Geological Survey Building (under construction).

6.3. He submitted that the advantages of reflector system cut-off luminaires are:

- (i) No upward light, resulting in the elimination of direct sky glow.
- (ii) Control of obtrusive or stray light, resulting in the minimisation of light spill and glare to nearby residents, transport routes signalling systems.
- (iii) An increase in illumination levels and system efficiency due to the fact that all available light is distributed downward, thus improving ground level visibility and security.
- (iv) Asthetic appearance of an installation is enhanced...⁷⁸

6.4. In informal discussion, Mr Bianco added the following:

- quality lighting costs roughly half as much again as alternative lighting (and sometimes even double);
- quality lighting involves angling all lighting in a downward direction with none escaping upwards;
- some big retail developers are choosing to install quality outdoor lighting, such as Westfield in a large new shopping complex at Tuggerah NSW; and
- an excellent example of quality outdoor lighting (perhaps the best in Australia) is along a major eastern highway from Perth Airport past the Casino to the Cental Business District.

⁷⁷ Submission dated 9/5/97 p2

⁷⁸ *ibid*

LIGHTING ANALYSIS & DESIGN (CONSULTANTS)

6.5. Mr R.Wilson of Lighting Analysis & Design (independent consultants) made the following points (*inter alia*):

- there is a problem with the quality of outdoor lighting in Canberra;
- some aspects of the Government's submission are disappointing;
- there should be a lighting code; and
- Australian Standards are 'a step in the right direction'.

There is a problem with the quality of outdoor lighting in Canberra

6.6. Mr R.Wilson submitted that there has been 'an increase in spill and obtrusive light in the A.C.T.' since 1988 and he suggests 'stricter housekeeping' in relation to the 'unexplained mixture of standard and cutoff lanterns on the same stretch of roadway'. He also suggests that an independent audit be undertaken of street lights and 'existing floodlighting installations' so as to identify some 'ineffective and wasteful installations'.⁷⁹

6.7. Mr Wilson is convinced that 'the main contributors to night sky pollution... [are] streetlighting - with its extended hours of operation - and floodlighting - due to its use of high-powered lamps'.⁸⁰

Some aspects of the Government's submission are disappointing

6.8. Mr Wilson considers that 'the parties to the Government's submission believe that the status quo and retaining well known and 'comfortable' componentry is the best solution. I find this approach disappointing, whilst appreciating the necessity of keeping costs under control'.⁸¹

6.9. In relation to the Government's claim that mercury lamps are manufactured in Australia while low-pressure lamps are only available from overseas, Mr Wilson comments that 'lamp manufacture in Australia has always been limited to incandescent and fluorescent lamps'.

6.10. In relation to the Government's claim that mercury lamps have a life of seven years compared to three years for low-pressure sodium, he suggests this tells only part of the story:

Catalogue information will show that average or rated lamp life for mercury lamps is generally better than 24,000 hours. For streetlighting applications it is usual to apply an annual operating time of 3,500-4,000 burning hours. By using the lower figure, simplistically it would be easy to draw the conclusion that the lamp will give seven years' service.

⁷⁹ Submission dated 25/4/97

⁸⁰ Supplementary information dated 7/7/97

⁸¹ Supplementary information dated 24/7/97

[But] two other factors must be considered. Firstly, and perhaps most importantly, throughout the lifetime of the lamp it draws the same power from the electricity supply; but gradually produces less light... This means that the cost per unit of light increases as the amount of light decreases. In the case of mercury lamps, at 24,000 hours lifetime, the light output would be approximately a mere 55 percent of the original output. The ramifications of this in terms of safety, cost of maintenance and operation et cetera are obvious.

The second point is that this 24,000 hour lifetime is based on 50 percent of the lamps failing, so economic argument must include increased maintenance costs. It is usual practice by well-organised authorities to do what is termed bulk lamp changing at an interval where the degree of lamp failures up to that time is quite low and the lumen depreciation is not reduced by more than 20 percent. Practically, this means that lamp changes occur at about 10-12,000 hours, thus making the real lifetime about 3 1/2 years.⁸²

6.11. Mr Wilson submitted that 'new technology in both equipment and design techniques allow closer control of waste light' at a 'relatively small increase in... cost'. He stated that 'many parts of the world' now use high-pressure sodium lamps 'outside of the public precinct' and metal halide lamps 'where people are walking [and congregating], so people look better'. The latter are probably three times more expensive but he expects this disproportion to fall as larger volumes of the lamps are used.⁸³

6.12. In relation to the Government's claim that semi-cutoff lanterns permit a wider distribution of light poles (and hence decrease costs) than do full cutoffs, Mr Wilson comments:

The general statements made are of course, quite correct for certain situations. This applies when working to absolutely maximum spacings allowed by the street lighting code [Australian Standard 1158]. In many instances, due simply to spacing geometry limitations, the spacings are reduced to below the maximum, thereby making it quite practical to replace semi-cutoff lanterns with cutoff types. This applies particularly in built-up areas such as Civic.

It is also possible that some early installations have spacing geometry below the present maximum due to less efficient equipment then available, combined with the engineer's considered decision to reduce the pole-spacing to improve the quality of the overall installation. Where this is the case, modern cutoff lanterns could be used to provide a complying installation.⁸⁴

There should be a lighting code

6.13. Mr Wilson supports a lighting code:

Lighting ordinances originated in cities which host an astronomic observatory. Now more and more areas, particularly in the US, that have lighting ordinances have no real interest in a close-by observatory. In other words, they are

⁸² Supplementary information dated 24/7/97 (emphasis in original)

⁸³ *Transcript* 4/7/97 pp37-38

⁸⁴ Supplementary information dated 24/7/97

becoming aware that their city is a better city and a nicer city to live in without a lot of glaring lights...

[The Tuscon lighting ordinance requires that] when people submit their Development Application, a major accent is given to lighting... All of the streetlighting... is full cutoff lighting. They do have a propensity for going towards low-pressure sodium because this is favoured by astronomers... They are very negative towards mercury... [and] the rest of the lighting is done mainly with high-pressure sodium. That is public lighting.⁸⁵

I believe the A.C.T. should institute an effective outdoor lighting ordinance as is done in several major cities in the US, and have this carefully policed. We have an Australian Standard AS4282 INT, which could form a basis for such an ordinance. An excellent American example is that for the city of Tuscon, Arizona.⁸⁶

6.14. Mr Wilson considers 'Canberra should be showing the way for the other capital cities and major rural centres in controlling spill light'⁸⁷:

I would hate to see our national capital embodying primarily a light source which is at the end of its life cycle [namely, mercury lamps]. I believe that our national capital should be using all the modern techniques that are available - new light sources, those embodied in new fixtures with highly detailed reflectors which put the light exactly where you want it.⁸⁸

Australian Standards are 'a step in the right direction'

6.15. Mr Wilson stated that Australia has 'an interim Australian Standard on obtrusive light' which is AS4282. He considers that this Standard will form the basis for an International Standard in the future. He stated that the Australian Standard for streetlights is AS1158 which was recently amended to include 'a clause that restricts upward light [to] six percent... [which] at least is a step in the right direction'. He is not impressed with Standards for sportsgrounds but notes that 'there are lighting fittings available which... [do] not have any light [released] in the upper hemisphere at all. It is all down... Again, the costs go up a little, but it can be done'.⁸⁹

NATIONAL NEON SIGNS

6.16. National Neon Signs submitted that 'quality signage and lighting will enhance the overall character of Canberra'.⁹⁰

⁸⁵ *Transcript* pp34-35

⁸⁶ Submission

⁸⁷ Submission

⁸⁸ *Transcript* 4/7/97 p35

⁸⁹ *Transcript* 4/7/97 pp36-38

⁹⁰ Submission dated 17/6/97

7. INDIVIDUALS: EVIDENCE

MR VON BEHRENS

7.1. Mr von Behrens submitted that ‘light pollution threatens to extinguish the stars and thus rob us of our experience of the night, the stars and meteors’, depriving us of an understanding of ‘core aspects of our culture’, namely those based on observation of the night sky. He provided many examples from literature of references to the stars.⁹¹

DR IANNA

7.2. Dr Ianna (Associate Director of the Leander J. McCormick Observatory of the University of Virginia, and Observatory Visitor at Mount Stromlo) made the following points (*inter alia*):

- quality outdoor lighting is the correct amount of light for a specific task;
- there should be full cutoff fixtures;
- sodium lamps are advantageous;
- Standards are not well developed to ensure quality outdoor lighting;
- lighting codes can be very simple; and
- a strategic plan for Canberra should include an overall lighting master plan.

Quality outdoor lighting is the correct amount of light for a specific task

7.3. Dr Ianna defined ‘quality’ outdoor lighting in the following way:

Quality lighting is appropriate lighting, carefully designed for the specific application. It is better lighting, but better lighting does not automatically mean more lighting. It means the correct amount of light for the task, as nearly free from glare as possible, increasing visibility and safety. Quality lighting aids people in seeing what they need to see, it does not leave you temporarily blind when you depart the lighted area, nor does it waste energy lighting the undersides of clouds. Bright, glary lighting is bad lighting. Glare never helps visibility. Wasted light is wasted money.⁹²

7.4. Dr Ianna submitted that quality outdoor lighting has ‘important ramifications for safety, good visibility after dark, aesthetics in the built environment, energy usage, and the preservation of the natural environment, including the beauty of the night sky’. He called ‘for strong standards and guidelines’.⁹³

⁹¹ Submission dated 5/5/97

⁹² Submission dated 25/4/97

⁹³ *ibid*

7.5. Dr Ianna (a frequent visitor to Canberra) claims that Canberra has 'indiscriminate flood lighting in car parks, glary roadway lighting fixtures, and grossly overlit pedestrian crossings'. He cited 'a pedestrian crosswalk... illuminated to 1250 [lux]..., which is absurd' given that the illumination level 'from a full moon... is about 0.17 lux [and this] is adequate for a night-time stroll in a rural setting'.⁹⁴

There should be full cutoff fixtures

7.6. Dr Ianna stated that 'car park and roadway lighting should be accomplished with full cutoff fixtures' since:

full cutoff lighting fixtures give as good a lighting distribution for roadway lighting as do semi-cutoff fixtures (ones with dropped refractors) and without the adverse effects of glare, which can compromise driver visibility... It does not cost more to use full cutoff, low glare fixtures and it does not compromise lighting levels.⁹⁵

7.7. In his oral testimony, Dr Ianna stated that a road can be lit 'just as well - the same number of poles, the same pole spacing - with a full cutoff, almost glare-free luminaire, as [with] the partial cutoff, glary luminaire'.⁹⁶ He stressed that: 'It is not true that more poles are required with flat visor fixtures if a modern quality fixture is used'.⁹⁷ He acknowledged that it might be judged attractive to 'leave a little bit of light that is partially shielded on some of the roads, so you get the sense of where the bridges go and the triangular layout [of Canberra]'.⁹⁸ He added:

The most important thing in controlling lighting is using shielded lights... [that is,] minimising the amount of light that is going up in the air, which is all wasted light and all wasted energy.

The next best thing that you can do is to be sure not to over-light areas since the light is reflected upwards. Depending on the surface, something in the order of 15 to 40 percent of the light will be reflected upwards. So using the right amount of light is also very important.⁹⁹

7.8. Dr Ianna stated his 'impression' that:

ACTEW is tending away from using these better lights. They want to go to the partially shielded lights because of this argument of needing fewer of them. I think the issue is the particular luminaire which is their standard, and finding a better luminaire and doing a better job that way, not by using out-of-date lighting fixture designs and arguing that that is the way to go.¹⁰⁰

⁹⁴ *ibid*

⁹⁵ *ibid*

⁹⁶ *Transcript 27/6/96 p27*

⁹⁷ Written statement to the Planning & Environment Committee dated 27/6/97

⁹⁸ *Transcript p30*

⁹⁹ *ibid p27*

¹⁰⁰ *ibid p30*

Sodium lamps are advantageous

7.9. In comparing the energy use of mercury vapour lamps and low-pressure sodium lamps, Dr Ianna stated:

The main point is that a low-pressure sodium lamp, being the most efficient lamp available or the most efficient lighting technology, uses 65 percent less electricity than a mercury vapour light...

The comparison of using low-pressure sodium versus mercury vapour for 10,000 lamps is something in the order of \$180,000 per year in energy costs...

Low-pressure sodium has other advantages in that a low-pressure sodium lamp that is burning all night near a tree does not distress the tree nearly as much, or at all, actually, compared to other lights. Lights, metal halides and mercuries next to trees kill them, and low-pressure sodium does not do that...

The high-pressure sodium is the pinky yellow one. The low-pressure sodium is the monochromatic, more intensely yellow light... The drawback of low-pressure sodium is that it provides no colour rendition at all, but often there are other ways around the colour rendition problem. I have seen a car dealership in the US lit almost entirely with low-pressure sodium, as bad as it is, but they add ten percent fluorescent, and it brings back most of the colour rendering qualities.¹⁰¹

7.10. Dr Ianna submitted a table entitled 'Operating Data and the Economics of Different Lamps' (sourced from the International Dark-Sky Association - dated 1990). It is reproduced as Table 4. It shows the high operating cost of mercury lamps compared to sodium lamps.

Standards are not well developed

7.11. Dr Ianna commented as follows on lighting Standards:

My statement here particularly emphasises roadway lighting. But it has to do with lighting Standards and the state of the art in lighting Standards. In fact, we are not very far along. There are a lot of Standards that, unfortunately... are basically wrong - they are not seriously wrong, but they are not ideal.

Current lighting research is still dealing with basic things, like trying to figure out good ways to light car parks. People really do not know. There is not the research basis to show the best way to light something as simple as a car park, let alone roadways and other more complicated things.

In the US, sometimes, in lighting ordinances, people have used the Illuminating Engineering Society [IES] Standards. The IES is very quick to say that these are recommended practices. They may be widely adopted, but they are not legal Standards and they are constantly under revision. There are in fact, major revisions coming along.¹⁰²

¹⁰¹ *Transcript 27/6/96 p28*

¹⁰² *ibid p26*

7.12. Dr Ianna cited the Australian/New Zealand Standard for Road Lighting (AS/NZS 1158.1.3:1997) which:

is based on International Commission on Illumination recommendations and some additional research. A short example illustrates the limitations to the state of the art. Appendix C of that publication discusses road lighting as an accident countermeasure. Part C4 states: '62 lighting and accident studies from 15 countries have been evaluated. Some 95 percent of results show lighting to be beneficial, with about one third of these having statistical significance', in other words, two thirds of the studies are NOT statistically significant. In part C5 you read that 'little can be said definitely about the relationship between accident reduction and... lighting quality... There is some evidence that, if uniformity is too great [so reducing contrast], the accident benefit associated with a particular light level may be reduced... There is no information available on the influence of other quality criteria, such as glare, on accident reduction'.¹⁰³

7.13. Dr Ianna concludes that 'even if it is a published Standard, it need not be - and probably is not - correct in all instances, and should be applied with caution'.

Lighting codes can be very simple

7.14. Dr Ianna commented on lighting ordinances (or codes) in the US:

The simplest one I have come is just two sentences. It says: 'Lamps used to illuminate ground areas shall be hooded or so shielded that light shines downwards. Structures or buildings shall not be illuminated by directing light upward from the ground, but may be illuminated by mounting lamps along the top edges of the wall with such lamps hooded so as to shine downward'.

That is very simple, and presumably effective. Throughout the US there has been a movement towards local lighting ordinances, and in most cases one of the first lighting ordinances in the US - the one from Tuscon, Arizona - has been adopted as a model. That is rather more complicated than the previous example. It does require full shielding on almost all lights. Low pressure sodium lamps are allowed to be partially shielded. They do not require shielding full incandescent lamps of 160 watts or less since their contribution to up-light is minimal. They have requirements on advertising signs. Sports lighting is to be designed to minimise up-light, spill light and glare. For some kinds of lighting there is an 11.00pm curfew.

In Arizona mercury lamps are now prohibited. Retail outlets are not allowed to sell mercury vapour in Arizona. I think there are two reasons for that. One has been the impact of the large ultraviolet component on astronomy, but the other is that invariably in the US mercury lamps are in bad fixtures...

There is another example of lighting ordinance... in Flagstaff where they have not emphasised so much shielding as limiting the amount of light on a given area. They have something in the order of 20,000 lumens per acre in zones around their observatories, with up to 50,000 lumens per acre elsewhere. This

¹⁰³ Written statement to the Planning & Environment Committee dated 27/6/97 [emphasis in original]

apparently has been quite popular with developers and so forth in the area because it gives them a lot more flexibility in installing lighting.¹⁰⁴

A strategic plan for Canberra should include an overall lighting master plan

7.15. Dr Ianna considers that, in Canberra's case:

There is a clear need to use full cutoff luminaires and downward-pointing lighting with the consideration of high-pressure sodium and low-pressure sodium for their high energy efficiency in roadway, car park, decorative and architectural lighting, with some attention to signage.

For the longer term, I would certainly urge consideration of lighting within the broad perspective of a strategic lighting master plan enhancing the special character of Canberra's overall design, helping to characterise and increase the visual quality of Civic and the town centres, aiding redevelopment plans for Northbourne Avenue, and for the general enjoyment of all aspects of Canberra at night, not the least of which is its starry sky.¹⁰⁵

7.16. Dr Ianna quoted a US architect: 'We have not achieved inviting environments [in our cities] partly because in recent years we have stressed quantity rather than quality of night lighting'. Dr Ianna suggests that a lighting master plan might address, not just the 'architectural and structural aspects of a city', but be integrated with efforts to reduce excessive lighting, to improve a feeling of safety and comfort in city centres, and to serve as a 'powerful marketing tool for towns and cities looking for a competitive advantage' - 'in this particular case, helping to market Canberra as an attractive tourist destination'.¹⁰⁶

7.17. Dr Ianna concludes: 'Canberra already has some of the above design elements in place, with the advantage of wonderful viewing points, but the night time features are being blurred by the spread of uncoordinated, poor-quality lighting in quantity'.¹⁰⁷

MR LYNKA

7.18. Mr Lynga submitted that:

The Southern stellar sky is very much more impressive than anything one might see from the Northern Hemisphere, with the centre of the Milky Way and our two closest galaxies visible during most of the year as well as an impressive number of bright stars... This is very much part of the visual environment to which Australians through generations have been accustomed and that has enhanced their experience of nature. To destroy this by strong outdoor lighting is depriving people of something valuable. When I first came to Canberra in 1961, the stellar sky was indeed quite impressive to behold, whereas now it is difficult even to see the brighter stars from central parts of our otherwise beautiful city.¹⁰⁸

¹⁰⁴ *Transcript* pp27-28. The simple lighting ordinance (referred to in the first paragraph of the quotation) applies in Windsor Township, Berks County, PA

¹⁰⁵ *ibid* p29

¹⁰⁶ Written statement to the Planning & Environment Committee dated 27/6/97

¹⁰⁷ *ibid*

¹⁰⁸ Submission dated 3/5/97

MR MORLAND

7.19. Mr Morland stated that:

As a ratepayer I object to the wastage of energy prevalent in street lightning... due to poor design, a significant amount of light from road and street luminaires is sent upwards...

As a result, this light no longer can be regarded as illumination but is converted into an annoying glare. This glare can become almost dangerous when the road is wet.

A well designed shield on the luminaires to cut off the light and send it downwards would eliminate this problem. Having most of the light shining downwards would allow us to use lamps with a lower wattage, hence using less electricity and accordingly reducing costs. Or, alternatively fewer luminaires...

[Further,] low pressure sodium lights... are very economical to use... [and used] with luminaires with a well designed reflective cutoff shield... produce enough light...¹⁰⁹

7.20. Mr Morland pointed out the risk of losing 'naked eye sight of all five stars in the Southern Cross' and commented: 'What a shame it will be if we can no longer see our National symbol from our National capital'.¹¹⁰

MR NELMES

7.21. Mr Nelmes suggested 'the use of lower wattage lights when possible, light shades that direct light downwards where it is needed, and the reduction of dangerous street-light glare at intersections'. He stated that 'Canberra's night-time skyglow could quite feasibly be reduced by half, providing us all with long-term cost savings, increased safety and a natural night sky to enjoy'.¹¹¹

MR POZZA

7.22. Mr Pozza submitted that:

There is an unusually clear confluence of economics and the environment on the issue of public (and private) lighting. Seldom does efficiency [and] effectiveness combine so elegantly with the environment. There is some initial investment [in providing quality outdoor lighting], but the payout period is very quick (perhaps three or four years). And this payout period is shortening further with developments in lighting technology, and the increasing cost of energy.¹¹²

DR PURCELL

7.23. Dr Purcell submitted that 'it is timely for light pollution (which is also a form of visual pollution) to be controlled'. He considers the A.C.T. has 'far too many

¹⁰⁹ Submission dated 8/5/97

¹¹⁰ *ibid*

¹¹¹ Submission dated 5/5/97

¹¹² Submission dated 1/4/97

streetlights [and] many are poorly designed in that they ‘leak’ a great deal of light into the sky overhead’. He suggests that the total annual bill for street lighting in the A.C.T. is higher than it needs to be.¹¹³

7.24. Also, he queries the utility of floodlighting buildings after midnight and noted that much of the floodlighting is directed upwards rather than downwards. Also, he stated that sporting fields are excessively lit for practice/training sessions (as against competition matches).

7.25. In relation to security lighting, he commented:

Many areas which are lit continuously at night allegedly for security purposes could more efficiently and effectively be lit intermittently by ‘triggered’ lighting which turns on when someone enters the area, thereby drawing attention to the intruder and/or providing the necessary illumination when needed. This applies equally to individual households... [and] the legislation should be changed to prevent this trespass on the rights of individual households.¹¹⁴

7.26. In relation to Mount Stromlo Observatory, Mr Purcell stated that it ‘is not only a scientific research facility but is also a very valuable educational resource for the nation’ - and attracts many tourists to Canberra. Mr Purcell would rather curtail light pollution in order to keep Mount Stromlo operating than see the Observatory closed.

MR TABUR

7.27. Mr Tabur submitted that his recent discovery of one new comet was only possible by taking his telescope ‘at least 50km from Canberra’, due to the ‘skyglow caused by Canberra street lighting and other outdoor lighting’. He stated:

a sensible outdoor lighting policy would go a long way to curing this problem. If cutoff fixtures were installed on all street lighting, the light would be directed towards the ground where it is needed and not into the sky.¹¹⁵

MR W. WILSON

7.28. Mr Wilson stated: ‘I am annoyed and disgusted by the lack of lighting along some A.C.T. paths...[many of which] are well established and regularly utilised’.¹¹⁶

¹¹³ Submission dated 8/5/97

¹¹⁴ *ibid*

¹¹⁵ Submission received 22/4/97

¹¹⁶ Submission dated 22/4/97

8. CONCLUSION

8.1. Arising out of the material summarised in preceding chapters, the committee considers that it has gained a very good insight into the issues associated with providing quality outdoor lighting in the A.C.T. In this concluding chapter, the committee has organised material as follows:

- the aim of quality outdoor lighting;
- the significance of Mount Stromlo Observatory;
- is there a problem of excess lighting in Canberra?
- the importance of cutoff lights;
- the importance of sodium lights;
- the responsibility of Government bodies;
- the use of Australian Standards;
- the usefulness of an education strategy; and
- the usefulness of a lighting code.

The aim of quality outdoor lighting

8.2. The committee appreciates the concern of the A.C.T. Government to ensure that costs are among the key factors to be considered in assessing the adequacy of outdoor lighting and in determining the appropriate standard for such lighting [refer paragraphs 1.3, 2.2 and 2.11].

8.3. In essence, the committee considers *that the aim of quality outside lighting is to provide cost-effective and energy-saving lighting that is designed for a specific task and which facilitates public safety, security and recreation while preserving dark skies (to the maximum extent possible).*

8.4. Like some submitters, the committee considers it very likely that quality outdoor lighting will lead automatically to the better preservation of dark night skies.

The significance of Mount Stromlo Observatory

8.5. The committee considers it is important for the A.C.T. to protect the environment around Mount Stromlo Observatory due to the contribution it makes to the economic, tourist and academic life of Canberra [see paragraphs 4.15, 5.3, 5.10 and 7.26] . The facility is world class and has a long operating life. In conjunction with the other astronomical-based facilities in Canberra [refer paragraph 5.10], it provides a distinctive and important contribution to Canberra's lifestyle and workplace. *The committee would not wish the Observatory to close down or move.*

8.6. Therefore, the committee endorses the Government's present program to replace existing mercury vapour lighting in Weston Creek by sodium lighting, at a

total cost of about \$0.8m [paragraph 2.14]. However, the Government is not certain about how long this process will take. In view of the significance of Mount Stromlo Observatory, the committee suggests that the replacement program be hastened.

8.7. The committee recommends that:

- **the Government hasten the current program to replace mercury vapour lighting in Weston Creek by, preferably, low-pressure sodium lighting.**

8.8. It also follows from recognising the importance of Mount Stromlo Observatory that the A.C.T. Government and the National Capital Authority should carefully monitor the effect of increasing suburban light on the operations of the Observatory, with a view to minimising the adverse impact of public and private lighting.

8.9. The committee appreciates that a similar sort of issue (to that at Mount Stromlo) exists in relation to street lights and sportsground lights in the vicinity of the Canberra Planetarium at Dickson [see paragraph 5.15]. The committee is persuaded that this facility is a valuable asset to Canberra and that there exists sufficient reason to take deliberate steps to protect the quality of outdoor lighting in its vicinity. The committee understands that the appropriate steps are not excessively expensive or extraordinary. The steps appear to include the installation of full cutoff lights along part of Antill Street, Dickson - along with careful design and placement of lights on the nearby sportsfields.

8.10. The committee recommends that:

- **the Government take appropriate steps to protect the quality of the outdoor lighting environment in the vicinity of Canberra Planetarium at Dickson. This may involve the installation of full cutoff lights along part of Antill Street, Dickson, and on the nearby sportsground.**

Is there a problem of excess lighting in Canberra?

8.11. The committee understands the concern of Government that it should be demonstrated there is a 'problem' of sufficient seriousness before considering the nature of possible solutions [paragraph 2.16].

8.12. Based on what members of the committee saw on the night tour of Canberra and on the material presented during the course of this inquiry, the committee considers that *outdoor lighting in Canberra is brighter than it needs to be*. The committee cites the bright lighting of sportsgrounds (such as Manuka Oval from Red Hill Lookout), of warehouses (such as the former Department of Administrative Services complex at Fyshwick), of caryards, some public buildings, some roadways and some ceremonial structures (such as flagpoles in Civic on the London Circuit/Northbourne Avenue intersection, and even the flagpole outside the Members' Entrance of the Legislative Assembly).

8.13. By saying that Canberra's outdoor lighting is brighter than it needs to be, the committee in no way is suggesting that existing lights on pedestrian paths, bike paths and roads are adequate in all cases.

The importance of cutoff lights

8.14. The committee notes universal agreement that measures to restrict upward spill of light are desirable. This means that full cutoff lanterns are the optimum type of fixture.

8.15. The committee notes the fact that A.C.T. has only 2,860 cutoff lights out of a total of about 62,000 streetlights [paragraph 2.5]. The proportion of full cutoffs to the total number of lights is unlikely to change much, given the Government's clear preference for semi-cutoff lights [paragraph 2.11].

8.16. The committee is concerned about some of the reasons given by the Government for preferring semi-cutoff lights [paragraphs 2.11, 2.12 and 2.13]:

- in relation to the claim that semi-cutoffs can be spaced more widely than full cutoffs and hence are far more economical, the committee was told by officials that they had under-estimated the number of situations in which full cutoffs can be used on existing poles [paragraph 2.12]. The evidence of Lighting Analysis & Design confirms the basis for the officials' reassessment [paragraph 6.12]. At the least, these points suggest that full cutoff lights can be used on quite a number of existing mountings. However, the evidence of Dr Ianna suggests that they can be used on a far wider scale. Dr Ianna asserted that contemporary full cutoff lighting fixtures can 'give as good a lighting distribution for roadway lighting as do semi-cutoff fixtures' [paragraphs 7.6 and 7.7]. He stated that ACTEW is not using the optimal type of luminaire and hence should revise its standard [paragraph 7.8];
- in relation to the running costs for cutoff lights, the committee notes (a) the comment by Dr Ianna that they do not actually cost more [paragraph 7.6]; (b) the information contained in the 'Life Cycle Cost Comparison' of mercury lamps and shielded sodium lamps which shows that sodium lamps with shields have lower operating costs over a ten year period [paragraph 4.11 and Figure I]; (c) the statement by the National Capital Authority that the efficiency of cutoff lamps is continually improving [paragraph 3.4]; and (d) the fact that shielded lights enable the use of lamps with a lower wattage [paragraph 7.19];
- in relation to the glare from semi-cutoff lights being a plus (not a minus) in predominantly pedestrian environments (because it may enhance a feeling of pedestrian safety), the committee wonders whether this is actually the case - given that much of the light is randomly distributed. Also, such lights are often installed for traffic reasons rather than for reasons of pedestrian safety. Further, the committee was told that full cutoffs improve ground level visibility (because all available light is directed downward) and thus enhance a sense of security [paragraph 6.3];
- in relation to the amount of light directed above the horizontal, the committee simply notes the considerable disparity between the statement by officials that this is not more than 1.1 percent in existing Canberra lights and other comments to the effect that a much greater amount of light is directed upwards [paragraphs 5.25, 7.19 and 7.24];

- in relation to the amount of light that is lost in the lantern housing, the committee is not aware of the basis for the claim by officials that about 16 percent of light is lost in a typical semi-cutoff light and about 28 percent in a full cutoff light.

8.17. Further, the committee notes that two large cities in the US (Los Angeles and San Diego) have retrofitted full cutoff fixtures to existing (mercury) mountings [paragraph 4.10]; and notes the statement that full cutoff luminaires offer the highest standard of lighting control under the relevant Australian Standard [paragraph 6.1].

8.18. In view of the points made above, the committee concurs with the suggestion that ‘a cost-benefit analysis [be done] to determine the payback time of directionally efficient street lighting’ [paragraph 5.18].

8.19. The committee recommends that:

- **the Government institute a cost-benefit analysis to determine the payback time of directionally efficient street lighting. The analysis should be reported to the Legislative Assembly.**

8.20. While this recommendation addresses the streetlighting issue, it does not address the issue of how to encourage the use of cutoff lanterns in carparks, car sales yards and other places. The committee was impressed on its night tour of Canberra by the ‘bollard’ lighting fixtures used in the carpark at the new Tourist Centre on Northbourne Avenue at Dickson. Also, one submitter noted that the carpark of the new Winchester building in Belconnen utilised full cutoff heads [paragraph 5.14] and another submitter referred to the use of full cutoffs at Woden Valley Hospital, the new Foreign Affairs and Trade building in Barton and the new Geological Survey building [paragraph 6.2]. The committee considers it is important to encourage the widest possible use of cutoff fixtures.

8.21. In view of the present divided responsibility for lighting controls among a number of Government agencies and also the current ‘notional’ and ‘one-off’ planning/approval process [paragraph 2.4], the committee considers that the Government should institute specific measures to facilitate wider community use of cutoffs. This action should follow extensive consultation with interested groups including representatives of business, the tourist industry, police, government agencies and especially lighting professionals and retailers.

8.22. The committee recommends that:

- **the Government establish a body (comprising representatives of business, the tourist industry, police, government agencies and especially lighting professionals and retailers) to develop a strategy to promote the use of full cutoff lanterns in streetlights, carparks, car saleyards and other locations.**

The importance of sodium lights

8.23. In view of evidence presented in the course of the inquiry, the committee endorses the Government’s policy to replace 400 watt mercury vapour lamps on main roads by 250 watt high pressure sodium lamps [see paragraph 2.7].

8.24. However, the committee is concerned about the basis for the Government's policy to install mercury lights on other streets in the A.C.T. These are residential streets and they comprise the bulk of streetlight installations. The committee notes that each of the reasons might be questioned:

- the claim that it is 'common industry practise' to use sodium lights is not in itself a sufficient reason to install this type of light in the A.C.T. - especially once the deliberate decision is made to protect the operations of Mount Stromlo Observatory to the maximum extent possible;
- the claim by officials that sodium lights should be used because they are manufactured in Australia was acknowledged by those officials to be inaccurate (refer paragraphs 2.8 and 6.9);
- the claim about longer operating life may not take account of the rising cost per unit of light over time and the policy on bulk lamp changing [refer paragraph 6.10];
- the claim about lower operating cost needs to be clarified given the information contained in (a) the 'Life Cycle Cost Comparison' of mercury lamps and shielded sodium lamps which shows that sodium lamps with shields have lower operating costs over a ten year period [paragraph 4.11 and Figure I] and (b) the operating data for various lamps [Table 4]. Also, the Government itself submitted that the use of high pressure sodium lamps on main roads will achieve 'energy savings of approximately \$250,000 pa with a cost recovery period of only four years' [paragraph 2.7] and 'if we spend a bit more money now, in three or four years we will be getting our money back in the energy savings' [paragraph 2.9]. Further, Dr Ianna considers that 'the comparison of using low pressure sodium versus mercury vapour for 10,000 lamps is something in the order of \$180,000 pa in energy costs' [paragraph 7.9]; and
- the claim that the public prefer mercury lamps to sodium lights was disputed by some submitters who also suggested that - even if the assertion is accurate - this simply shows the need to establish demonstration fixtures and introduce an education strategy to show that other light fixtures can also produce good results [paragraphs 4.10 and 5.6].

8.25. In order to optimise quality outdoor lighting, the committee understands that security lights and ceremonial lights, as well as streetlights, should use sodium (wherever possible). The committee recognises that astronomers, in particular, want sodium lights to be universally used in lieu of mercury lamps, as the latter use more energy and produce large amounts of blue light which hinders astronomical activities.

8.26. Given the uncertainty about the detailed costs, over time, of various lighting types, the committee considers it essential to obtain clarification.

8.27. The committee recommends that:

- **the Government commission a cost-benefit analysis of the introduction of low-pressure sodium luminaires of the full cutoff type in all street applications,**

and call for expressions of interest in mass producing an add-on shield for existing luminaires. The result of the cost-benefit analysis should be reported to the Assembly.

The responsibility of Government bodies

8.28. Like some submitters, the committee is concerned about the division of responsibility among Government bodies for the regulation and operation of outdoor lighting. The division of responsibility is at two levels: between the Commonwealth and the Territory [refer chapters 2 and 3], and within the Territory's administration itself [refer paragraph 2.3].

8.29. In relation to the first matter, the committee notes the admission by the National Capital Authority that it has no specific outdoor lighting policy but is in the process of preparing a strategic lighting implementation plan [paragraphs 3.2 and 3.3]. The committee notes the Authority's statement that it encourages the use of full cutoff lamps 'where prudent and practical'. Further, the committee understands why the Authority would consider that, in relation to ceremonial lighting, some upward throw of light will be required to give certain national features an identifiable 'signature'.

8.30. The committee understands that the National Capital Authority has imposed a requirement on Telstra that proposed new lights on Telstra Tower be turned off after a certain hour (likely to be 1.00am). In part, this is in order to facilitate the migration of the Bogong Moth. It is possible that a similar sort of curfew at Parliament House would ease the practical problems caused by the Moth as well as facilitate the Moth's onward migration.

8.31. The committee recommends that:

- **the A.C.T. Government work with the National Capital Authority to minimise excessive lighting of ceremonial or national features of Canberra, including the outdoor lighting of Parliament House, Old Parliament House and Telstra Tower.**

8.32. The committee considers that, wherever possible, there should be consistency between the outdoor lighting requirements of the National Capital Authority and the A.C.T. Government. The committee is pleased that both are making use of current Australian Standards; and the committee expects that close consultation is taking place between the A.C.T. Government and the Authority on all planning matters including the use of outdoor lighting. However, it appears possible that the Standards may be differently interpreted and/or that additional requirements may be imposed in one jurisdiction for some types of lighting installations.

8.33. Further, the number of A.C.T. Government bodies with an interest in lighting probably hinders close understanding of each other's strategies and operations.

8.34. In addition, the committee notes that the perennial issue crops up in relation to lighting as it does with nearly every other aspect of planning in Canberra, namely, the extent to which Canberra should have a standard for lighting that is higher than other Australian cities, on the basis that it is the nation's capital. To set a higher standard is likely to cost more, which raises the issue of who is to pay: Canberra's ratepayers

(represented by the A.C.T. Government) or the nation's citizens (represented by the Commonwealth Government)?

8.35. At the present time, the Commonwealth Government is not sympathetic to the argument that financial assistance should be provided to the A.C.T. in order to meet the cost of a higher standard of amenity (such as lighting). It is recognition of this factor that may be influencing the A.C.T. Government to put the emphasis upon costs in its submission.

8.36. The committee considers that the Commonwealth Government should be reminded, on all possible occasions, of its responsibility for determining the standards - and for funding - those elements of Canberra that relate to the city's national role.

8.37. The committee recommends that:

- **the A.C.T. Government bring all possible pressure on the Commonwealth Government to fund those elements of Canberra (including lighting) that relate to the city's national role.**

8.38. One specific issue arising from the absence of a clear line of responsibility for lighting in Canberra concerns the capacity to develop the type of strategic, or master, lighting plan suggested by Dr Ianna [paragraphs 7.15-7.17]. The committee considers that Canberra has much to gain by developing and installing a lighting master plan that - while highlighting the architectural features of the city, its outline and key planning elements - also minimises excess light and enhances a feeling of safety and comfort. Such a plan would require the cooperation of the National Capital Authority.

8.39. The committee considers that a lighting master plan could be successfully integrated into marketing Canberra as a tourist destination. Again, the National Capital Authority has important responsibilities in this regard.

8.40. The committee recommends that:

- **the A.C.T. Government and the National Capital Authority investigate the development of a lighting master plan for Canberra, to be integrated into the marketing of Canberra as a tourist destination.**

8.41. The committee considers that the division of responsibility among the A.C.T. Government's own bodies is hindering the development of strategies to promote quality outdoor lighting. The committee is not convinced that the present planning and regulatory system is working to produce the best possible outcome in terms of quality outdoor lighting, especially given the 'notional' planning regime in place at present [paragraph 2.4].

8.42. The committee recommends that:

- **the A.C.T. Government improve the coordination of matters affecting the standard of outdoor lighting (both public and private) by identifying one**

government agency as having overall responsibility for setting lighting standards and monitoring the implementation of those standards.

The use of Australian Standards

8.43. The committee acknowledges the efforts of Government bodies to comply with relevant Australian Standards. The committee also appreciates the point made by a number of submitters that such Standards are guidelines rather than rules, and are embryonic (in that they are continually being formulated and tested). This means that, even where the Standards are met, the resultant lighting fixture may not be optimal.

8.44. This point appears to be well illustrated in the case of sportsground lighting. The committee heard a divergence of views about the effect of applying the relevant Standard in the A.C.T. The Government's submission gives the impression that quality outdoor lighting has been achieved whenever a sportsground installation complies with Australian Standards [paragraph 2.15] whereas other submitters considered that the Standard was not impressive and, by inference, more action was required than simply complying with the Standard [paragraphs 5.16 and 6.15]. A further submitter claimed that the present planning/approvals process can lead to departures from the Standard [paragraph 5.23]. Finally, Dr Ianna urged caution about the application of all Standards [paragraphs 7.11-7.13].

8.45. The committee urges Government officials to look beyond the existing Standards to determine the highest quality possible standard of lighting in the Territory. To this end, the committee considers that the Administration should play an active part in the development and testing of Australian Standards. The committee considers that officials would gain a wider knowledge of developments internationally if one or more Government agencies joined the International Dark Sky Association.

8.46. The committee recommends that:

- **the Government facilitate active participation by its agencies in the development and testing of Australian Standards for lighting. Further, that - where appropriate - one or more Government agencies join, as institutional members, the International Dark Sky Association.**

8.47. In relation to Standards, the committee was particularly struck by the argument put forward by some submitters that the Government has a very clear responsibility to ensure that Bruce Stadium (now being refurbished) should demonstrate very high quality outdoor lighting. So far as the committee knows, Bruce Stadium is the only Canberra sportsground that is equipped for colour TV transmission of night-time sports events (which requires a higher standard of lighting). The committee would like the Government to assure the Assembly that Bruce Stadium will meet 'best practise' in its outdoor lighting once the current construction activity is complete.

8.48. Of course, the same objective of meeting 'best practise' lighting fixtures should apply to all new sportsgrounds and to existing grounds that are being upgraded or refurbished.

8.49. The committee recommends that:

- **the Government ensure that high quality, down-only lighting is installed at all new sportsgrounds and at those existing sportsgrounds that are being refurbished. This includes the grounds at Bruce Stadium, Phillip and Manuka.**

The usefulness of an education strategy

8.50. The committee acknowledges the Government's preference for an education strategy to be developed if it can be shown that a real problem of ensuring high quality outdoor lighting exists. The Government also suggested measures to aid 'voluntary compliance', rather than prescriptive controls and legislation [paragraph 2.16].

8.51. *In light of the information contained in this report, the committee considers that an education strategy should be developed.* Its purpose would be to inform the people of the A.C.T. about the effect of inappropriate outdoor lighting and about the types of measures that can be taken to reduce the problem. The strategy should encourage householders to shield private lights as well as encouraging businesses and Government agencies to use appropriate fixtures. The strategy should be capable of use in schools.

8.52. One part of the strategy should deal with how security can be enhanced by the use of motion-detector lighting (which turns on when someone enters an area rather than staying on all the time). Another part of the strategy should deal with the use of time-controlled lighting that is intended to brightly illuminate an area for a limited time and then switch to a dimmer lighting. A further part of the strategy should inform sports associations about the measures and fixtures that can be used to achieve high quality outdoor lighting.

8.53. The committee considers that the strategy should utilise demonstration projects, as well as facilitate the 'sponsorship' of some lighting fixtures by private or public companies (perhaps particularly during celebratory occasions) [paragraph 5.18].

8.54. The committee considers that the development of the strategy should involve the widest possible involvement of interested individuals and organisations, including business, tourist representatives, police, resident groups, lighting professionals and retailers, astronomical groups and government officials from both the A.C.T. and Commonwealth. The strategy should not be 'imposed from above' but should reflect a common realisation that all parties have something to gain from improvements in outdoor lighting in the A.C.T.

8.55. The committee recommends that:

- **the Government facilitate the development of an education strategy to inform the people of the A.C.T. about the way that quality outdoor lighting can be provided. Representatives of business, the tourism industry, police, resident groups, astronomical groups, lighting professionals and retailers, the National Capital Authority, and other interested persons and organisations should be involved in developing the strategy. Demonstration projects and sponsorships should be encouraged by the education strategy.**

8.56. The committee also sees merit in the suggestion that local people be encouraged to monitor and report failed light fixtures, perhaps by using groups such as amateur astronomical societies and Neighbourhood Watch [paragraph 5.18].

The usefulness of a lighting code

8.57. A number of submitters referred to various codes that govern outdoor lighting in overseas jurisdictions and in at least two areas in Australia (around Cessnock in NSW in order to protect Coolang Observatory, and around Coonabarabran in NSW to protect the activities of Siding Springs Observatory). The committee's attention was drawn to a number of codes that might be used [paragraphs 4.4, 5.1, 5.5, 5.13, 5.19 and 7.14].

8.58. An outdoor lighting code should prescribe standards for new lighting fixtures while allowing existing fixtures to remain during their operational lifetime. It should not apply to households, because light from homes is not considered to be a major problem in night-time glare. However, householders should be encouraged to use appropriate lighting fixtures by way of the education strategy referred to above.

8.59. The committee is keenly aware of the need to address the issue of who is to ensure compliance with the code. The committee was told that in Tuscon and Boulder the assessment of each lighting application comes under the control of highly experienced lighting engineers.¹¹⁷ This issue needs to be carefully examined as part of the process of developing the code.

8.60. *The committee considers an outdoor lighting code is warranted in Canberra. However, the exact nature of such a code should follow development of the education strategy. This will give time for residents of the A.C.T. to become aware of the existing problem with excessive lighting of some outdoor areas and to understand that existing technology can alleviate these excesses. As with the education strategy, the widest possible public debate and consultation should precede the implementation of the outdoor lighting code.*

¹¹⁷ Supplementary material dated 7/7/97 received from Mr R Wilson (Lighting Analysis & Design)

8.61. *The Legislative Assembly's committee system is one way to facilitate wide community involvement. The Planning and Environment Committee is pleased to do what it can to facilitate the consultation process but, in view of the impending end of the present Assembly, considers that members of the new committee to be formed following the Territory election in February 1998 might like to take up this challenge.*

8.62. The committee recommends that:

- **the Government establish an advisory body to prepare an outdoor lighting code for the A.C.T. and to recommend how best to ensure compliance with the code. The advisory body should include, at the least, representatives of business, the tourism industry, National Capital Authority, police, resident groups, astronomical groups, lighting professionals and retailers. The lighting codes for Tuscon and Arizona (in the US) and the codes submitted to this inquiry by the Astronomical Society of Victoria and the Outdoor Lighting Reform Action Group are useful starting-off points.**

The committee considers that community consultation might be facilitated by involving an Assembly committee in this process and hence, the committee suggest that its successor committee in the Fourth Assembly (to be elected in February 1998) might take up this challenge.

Michael Moore MLA
Chair

12 November 1997

